

Europäisches Patentamt  
European Patent Office  
Office européen des brevets

**COPY**



(19)

(11)

**EP 1 547 681 A3**

(12)

**EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
07.09.2005 Bulletin 2005/36

(51) Int Cl.7: B01J 19/12, H05B 6/80

(43) Date of publication A2:  
29.06.2005 Bulletin 2005/26

(21) Application number: 04255177.0

(22) Date of filing: 27.08.2004

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR  
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**  
Designated Extension States:  
**AL HR LT LV MK**

- King, Edward Earl  
Charlotte, NC 28277 (US)
- Thomas, James Edward  
Harrisburg, NC 28075 (US)
- Hargett Jr., Wyatt Price  
Matthews, NC 28105 (US)
- Lambert, Joseph Joshua  
Charlotte, NC 28270 (US)

(30) Priority: 02.09.2003 US 605021

(71) Applicant: CEM Corporation  
NC 28106-0200 (US)

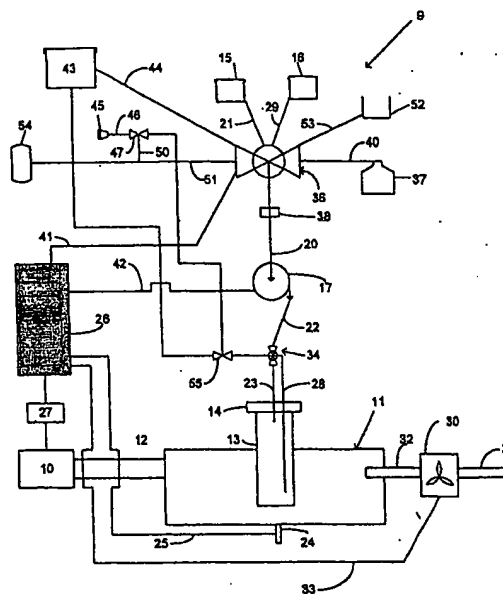
(72) Inventors:  
• Collins Jr, Michael John  
Charlotte, NC 28277 (US)

(74) Representative:  
**Bankes, Stephen Charles Digby et al**  
**Baron & Warren,**  
19 South End  
Kensington,  
London W8 5BU (GB)

**(54) Controlled flow instrument for microwave assisted chemical process**

(57) A controlled-flow microwave instrument is disclosed for chemical synthesis using heterogeneous or highly viscous starting materials. The instrument includes a microwave source (10) for generating electromagnetic radiation in the microwave frequencies, a microwave cavity (11) in wave communication with the source for exposing compositions placed therein to microwave radiation, a microwave-transparent pressure resistant reaction vessel (13) in the cavity, a source reservoir (15) for starting materials and related compositions, a pump (17) in communication with the source reservoir for pumping heterogeneous or highly viscous materials from the source reservoir to the reaction vessel, and a pressure-resistant valve (34) between the pump and the reaction vessel for isolating the reaction vessel from the pump and the source reservoir during application of microwave energy to compositions in the vessel and from any resulting high pressures generated therein.

Figure 1



**EP 1 547 681 A3**

**BEST AVAILABLE COPY**

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 04 25 5177

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-07-2005

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5672316	A	30-09-1997	AT 400009 B	25-09-1995
			AT 53294 A	15-01-1995
			DE 19506577 A1	14-09-1995
			FR 2717105 A1	15-09-1995
US 5387397	A	07-02-1995	AT 112978 T	15-11-1994
			AU 635903 B2	08-04-1993
			AU 4404089 A	01-05-1990
			WO 9003840 A1	19-04-1990
			CA 2000351 A1	10-04-1990
			DE 68918950 D1	24-11-1994
			DE 68918950 T2	16-03-1995
			EP 0437480 A1	24-07-1991
			KR 9710331 B1	25-06-1997
			NZ 230952 A	25-10-1991
EP 0335020	A	04-10-1989	US 4613738 A	23-09-1986
			EP 0335020 A1	04-10-1989
			US 4736083 A	05-04-1988

EPO FORM P0458

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82